

Application No. 10/603,007
Amendment dated December 20, 2004
Reply to Office Action of September 20, 2004

Amendments to the Specification:

Please replace paragraph [0001] with the following amended paragraph:

[0001] The present invention relates to ~~computer assisted~~ computer-assisted navigation and, more specifically, to a detachable support arm which may be used to couple a computer-assisted navigation reference array to an instrument.

Please replace paragraph [0005] with the following amended paragraph:

[0005] In such image-guided procedures, a robotic arm may be used to position and control the instrument, or the surgeon may manually position the instrument, and use the display of the relative position of the instrument and anatomical structure to properly position the instrument. Examples of various ~~computer assisted~~ computer-assisted navigation systems are described in U.S. Patent Nos. 5,682,886; 5,921,992; 6,096,050; 6,348,058 B1; 6,434,507 B1; 6,450,978 B1; 6,490,467 B1; and 6,491,699 B1. The disclosures of each of these patents ~~is hereby~~ are hereby incorporated herein by reference.

Please replace paragraph [0008] with the following amended paragraph:

[0008] The present invention includes a detachable support arm structure for coupling a computer-assisted navigation system reference array to an instrument, for ~~example~~ example, a surgical instrument, such that the geometry between the reference array and the surgical instrument is predetermined. By using a predefined geometry, registration of the instrument in the navigation system does not require calibration each time the reference array and support arm structure are coupled to the instrument.

Please replace paragraph [0024] with the following amended paragraph:

[0024] Fig. 1B is a partial perspective view of the surgical arrangement of ~~Fig 1A~~ Fig. 1A showing a surgical apparatus including the detachable support arm;

Application No. 10/603,007
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Please replace paragraph [0034] with the following amended paragraph:

[0034] Computer-assisted navigation systems are known in the art which provide for the registration of anatomical structures of patient 34 with a three-dimensional model representing the structure. Calibration for localization of instrument 44 facilitates the display of the relative positions of instrument 44 and anatomical structures, for example, the exemplary systems disclosed by U.S. Patent Nos. 6,236,875 B1 and 6,167,145, and U.S. Patent Application to Grimm et al. entitled "Implant Registration Device for Surgical Navigation System," Serial No. 10/357,754, filed February 4, 2003, the disclosures of which are hereby incorporated herein for reference by reference.

Please replace paragraph [0043] with the following amended paragraph:

[0043] To accurately orient the sixth degree of freedom about axis 90 (Fig. 2A) extending through boss 80, pin 84, which is laterally offset from boss 80 and protrudes from first end 72, engages with tight tolerance into pin receptacle 92 of mounting interface 79 (Fig. 1B). Engagement of pin 84 into receptacle 92 completes the locating of support arm structure 42 relative to mounting block 54, and therefore cutting guide 52. First extension portion 70 defines cutout 94 in which knurled knob 96 for engaging threaded fastener 82 ~~with threaded fastener 82~~ with threaded bore 88 (Fig. 1B), (Fig. 1B) is disposed. Tightening fastener 82 to bore 88 completes the fixing of support arm structure 42 relative to mounting block 54.

Please replace paragraph [0058] with the following amended paragraph:

[0058] Support arm structure 124 may also define ~~opening 148 opening 149~~ forming links 150 on opposite sides and connecting first end 132 to body 125 of support arm structure 124. Knurled knob 152 for rotatably engaging threaded fastener 146 is disposed in ~~opening 148 opening 149~~.

Application No. 10/603,007
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Please replace paragraph [0060] with the following amended paragraph:

[0060] Third embodiment support arm structure 160 shown in Figs. 5A and 5B is similar in design to second exemplary embodiment support arm 124 shown in Figs. 4A and 4B. One exception is that rectangular extension 162, upon which male dovetail mounting interface 164 and threaded receptacle 142 are defined, is oriented 90° relative to longitudinal axis 166 from the orientation of dovetail 140 of second embodiment support arm structure 124 shown in Figs. 4A and 4B. Additionally, referring to Fig. 5B, as can be seen at first end 168 which is located opposite rectangular extension 162, support arm structure 160 is narrower along at least one axis and is therefore more rectangular in cross-section than second embodiment support arm structure 124, shown most clearly at first end 132 of Fig. 4B. Similar to first and second embodiment support arm structures 42 and 124, first end 168 of third embodiment support arm structure 160 includes boss 170, threaded fastener 172 and rotational locating pin 174 defining instrument mounting interface 176. Also, knurled knob 178 is disposed in cutout 180 formed by oppositely located links 182.